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(56) Documents cited
GB 1258991 A GB 1242797 A GB 0841018 A
GB 0309787 A GB 0245867 A

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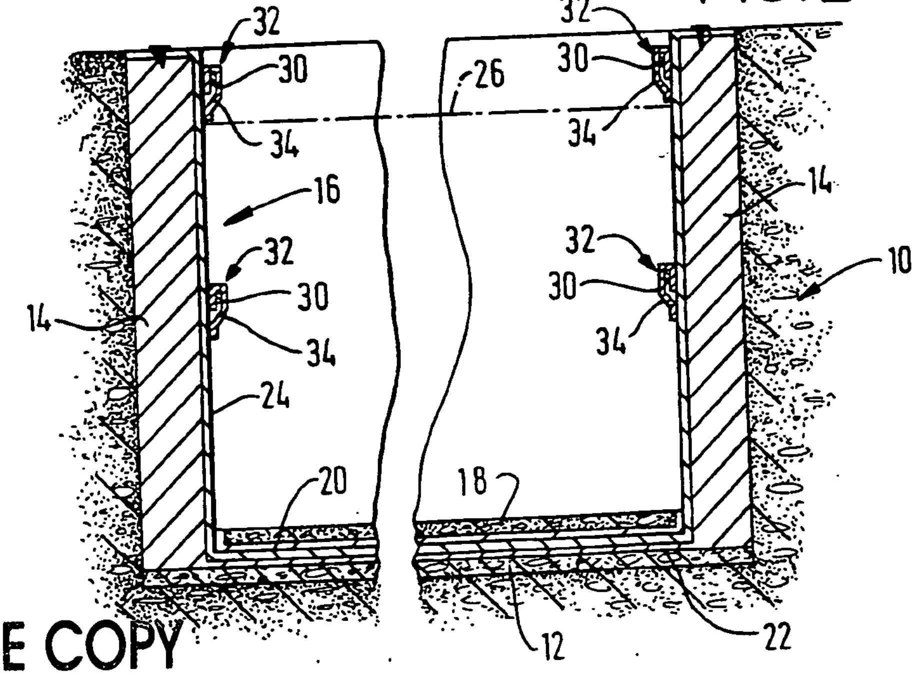
(54) **Tank constructions**

(57) A tank (10) has a bottom (12) and a wall surround (14) upstanding from therearound and a complementary shaped flexible liner (22) therefor extending across the bottom (12) and up the wall surround (14). The liner (22) is secured around its top to the wall surround (14). The liner (22) may have a protective layer of rigid material eg concrete (18) provided over its bottom. In other embodiments, the liner lies outside the wall 14, or can be between layers of walling. Preferably, the tank is formed in the ground. If the liner is internal, horizontal straps may be secured to the wall surround (14), and treated to be liquid-proof.

FIG. 2



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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FIG.1

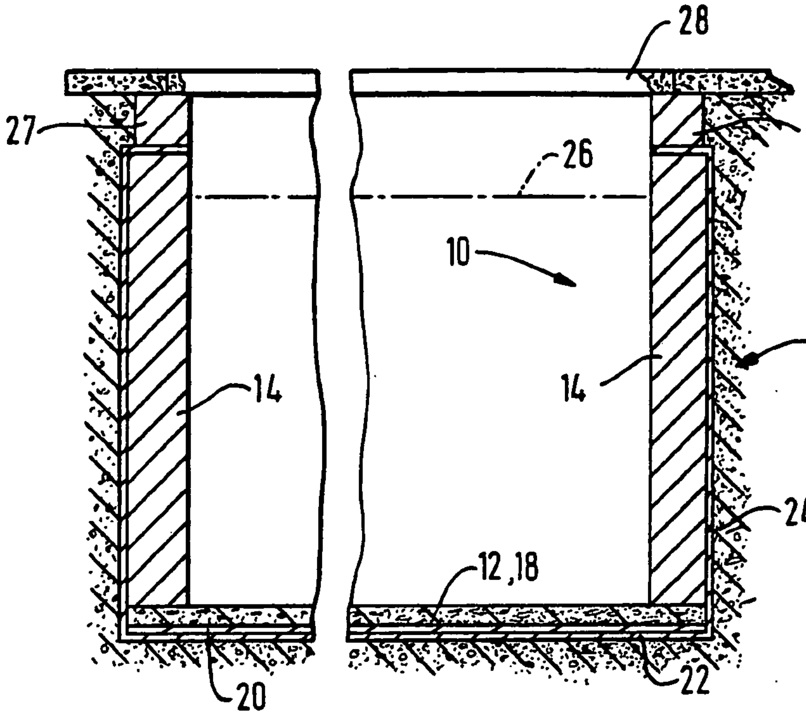
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FIG.2

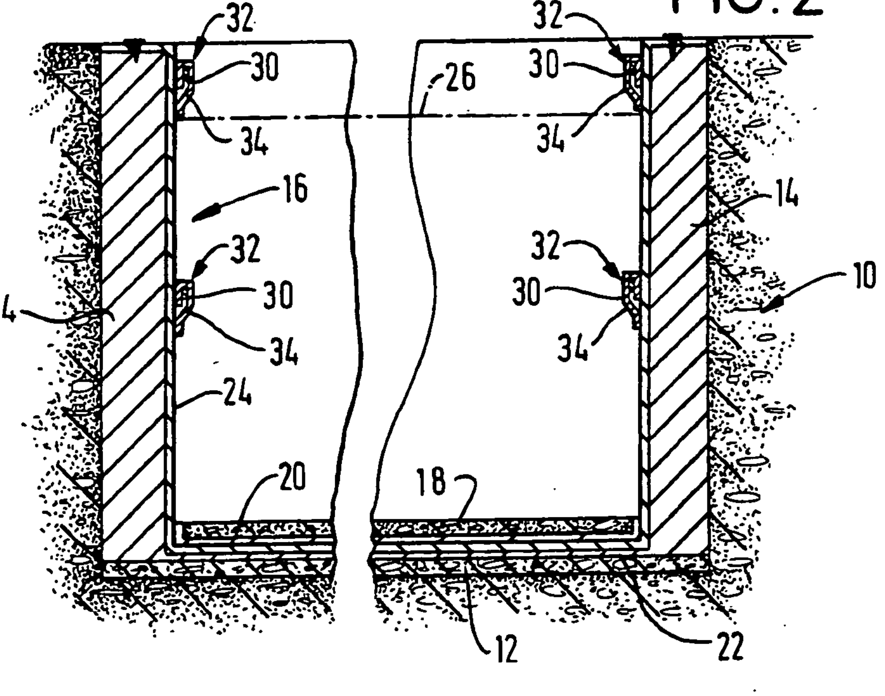
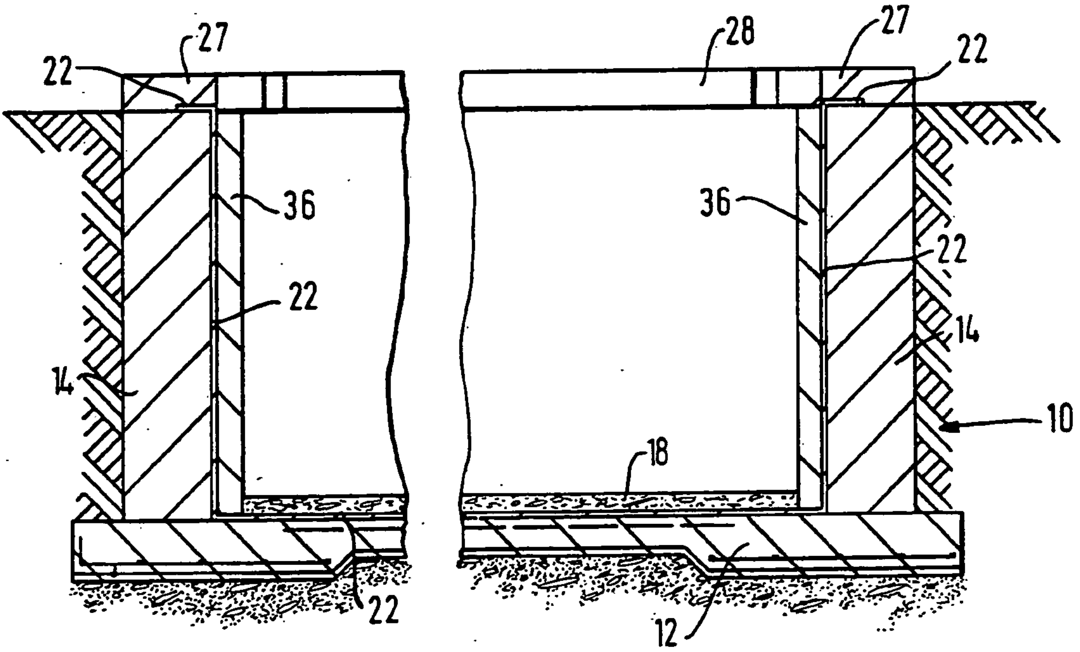


FIG. 3



TANKS FOR LIQUIDS.

This invention relates to tanks for holding liquids, mixtures of matter and liquids particularly, but not exclusively, slurry, or materials, for example silage, from which an effluent seeps. Such tanks are normally open-topped and rectangular in both horizontal and vertical cross-sections, and with the bottom fabricated in situ from concrete and the walls fabricated in situ from concrete or blocks bedded together with a jointing material, for example mortar. A disadvantage of such tanks is that over a period of time the chemicals in the slurry or other such liquid solutions attack or react with the jointing materials and these materials are gradually eaten away, or become porous, or crumble away causing the slurry or liquid solutions to seep therethrough to the ground surrounding the tank and hence into land draining into underground waterways thence to open waterways causing pollution of same.

It is an object of the present invention to obviate or mitigate this disadvantage.

Accordingly, the present invention is a tank having a bottom and a wall surround upstanding from therearound and a complementary shaped flexible liner therefor extending across the bottom and at least a short distance up the wall surround, the liner being secured around its top to the wall surround.

Preferably, the liner has a protective layer of rigid material provided over its bottom. The rigid material is desirably concrete. The liner preferably also has a layer of rigid material provided around its wall surround. The rigid material is desirably concrete or fabricated from blocks and a jointing material.

Preferably also, an intermediate layer of material spaces the liner from the bottom of the tank or surrounding ground. The intermediate layer is preferably a mat of fibrous material. The liner is desirably of reinforced waterproof material, for example of synthetic rubber material.

The liner may be positioned externally of the tank, or may be fitted internally of the tank with one or more vertically spaced, horizontally oriented straps secured to the wall surround. The straps and fastenings therefor are desirably covered with material and made waterproof.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawing, in which:-

Fig. 1 is a vertical cross-sectional view of a tank according to a first embodiment of the present invention;

Fig. 2 is a vertical cross-sectional view of a tank according to a second embodiment of the present invention; and

Fig. 3 is a vertical cross-sectional view of a tank according to a third embodiment.

Referring to the drawings, in general to both embodiments, a tank 10 has a bottom 12 and a wall surround 14 upstanding from therearound.

A complementary shaped flexible liner 16 with bottom 22 and wall surround 24 is provided therefor and is secured around the top of the wall surround 14 as shown and as described hereinafter. The liner 16 is of reinforced waterproof material, for example of synthetic rubber material such as sold under the Trade Mark HYPALON. The liner 16 has a protective layer 18 of rigid material provided over its bottom 12. The rigid material is, for example of concrete.

An intermediate layer 20 of material spaces the liner 16 from the bottom of the tank 10. The intermediate layer 20 is a mat of fibrous material of, for example that sold under the Trade Mark POLYFLEECE.

In Fig. 1, a first embodiment is shown in which the liner 16 is positioned externally of the tank 10. This embodiment is generally used when constructing new tanks. As can be readily understood, the location for the tank 10 is excavated, and a liner 16 positioned therein with its bottom 22 placed at the bottom of a levelled out base of the excavation. An intermediate layer 20 is placed over the bottom of the excavation and a short distance up the wall. The bottom 12 and wall surround 14 of the tank 10 are then fabricated inside the liner 16 as shown. The top of the liner 16 is placed over the top of the wall surround 14 as shown at a level above the required level 26 to which slurry or other solutions are filled. Capping components 27 to support slats 28 or the like are then secured on top of the liner 16 and wall surround 14. In this embodiment, the bottom 12 and protective layer 18 are one and the same.

In the second embodiment as showm in Fig. 2, the liner 16 is fitted internally of the tank 10, normally an existing tank, with one or more vertically spaced, horizontally oriented straps 30 secured to the wall surround 14. The straps 30, normally of metal and two of which are shown, are secured by fastenings (not shown). A strip 32, of the same material as the liner 16, is placed between each strap 30 and the liner 16 with an upwardly extending overhang 34. After the straps 30 are fastened to the wall surround 14, each overhang 34 is brought over the front of the respective strap 30 and secured to cover the strap 30 with material and made waterproof so that the chemicals in the slurry or other solution cannot react with the metal. An intermediate layer 20 is placed over the bottom 12 of the tank and a short distance up the side of the wall surround. A protective layer 18 of concrete is poured on top of this layer 20. The top of the wall surround 24 is secured to the top of the wall surround 14 which is intended to receive slats 28.

In a modification of Fig. 2 (not shown), the liner 22 is fabricated from separate pieces of material with a bottom piece extending over the bottom of the tank 12 and a short distance up the wall surround with its edge embedded and secured into a groove cut out in the wall surround 14. A first wall surround piece overlaps the top of the bottom piece and is secured adjacent to its top longitudinal edge by a strap 30. Successive other wall surround pieces can be provided each overlapping the next lower piece.

In Fig. 3, a third embodiment is shown in which like parts are denoted by like numerals. A tank 10 is provided having a bottom 12 and a wall surround 14. A liner 24 is provided internally thereof and secured in the manner stated in Fig. 1 with the top margin of the liner 22 overlying the wall 14 and being held in place by the coping components 27. A protective layer 18 is provided and a wall surround 36 made of blocks and jointing material is provided as shown.

The purpose of the protective layer 18 in each embodiment is to prevent damage ie. tearing or cutting of the bottom 22 of the liner 16 when, for example, a slurry mixer is introduced into the tank 10 to agitate and mix the slurry (if it has separated into stratas ie. a floating strata, a liquid strata and a sludge strata) prior to the slurry being pumped out, for example into a tanker for distribution.

In a modification of each embodiment, an intermediate layer 20 can be provided over the bottom of the liner 22 and a short distance up the wall surround 24 prior to the protecting layer 18 being provided.

Variations and other modifications can be made without departing from the scope of the invention as described above.

CLAIMS:

1. A tank having a bottom and a wall surround upstanding from therearound and a complementary shaped flexible liner therefor extending across the bottom and at least a short distance up the wall surround, the liner being secured around its top to the wall surround.

2. A tank as claimed in Claim 1, wherein the liner has a protective layer of rigid material provided over its bottom.

3. A tank as claimed in Claim 2, wherein the rigid material is desirably concrete.

4. A tank as claimed in Claim 1 or 2, wherein the liner has a layer of rigid material provided around its wall surround.

5. A tank as claimed in Claim 4, wherein the rigid material is concrete or fabricated from blocks and a jointing material.

6. A tank as claimed in any one of the preceding

Claims, wherein an intermediate layer of material spaces the liner from the bottom of the tank or surrounding ground.

7. A tank as claimed in Claim 6, wherein the intermediate layer is a mat of fibrous material.

8. A tank as claimed in Claim 7, wherein the liner is of reinforced waterproof material.

9. A tank as claimed in Claim 8, wherein the reinforced waterproof material is synthetic rubber material.

10. A tank as claimed in any one of the preceding Claims, wherein the liner is positioned externally of the tank.

11. A tank as claimed in any one of Claims 1 to 9, wherein the liner is fitted internally of the tank.

12. A tank as claimed in Claim 11, wherein the liner is secured with one or more vertically spaced, horizontally oriented straps secured to the wall surround.

13. A tank as claimed in Claim 12, wherein the straps and fastenings therefor are covered with material and made waterproof.

14. A tank substantially as hereinbefore described with reference to Fig. 1 of the accompanying drawings.

15. A tank substantially as hereinbefore described with reference to Fig. 2 of the accompanying drawings.

16. A tank substantially as hereinbefore described with reference to Fig. 3 of the accompanying drawings.

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